THE MUNICIPAL HOUSE CONDITION SURVEY PACKAGE: ANALYSIS OF DESIGN ISSUES AND RECOMMENDATIONS FOR FUTURE DEVELOPMENT

Prepared for:

RESEARCH DIVISION
CANADA MORTGAGE AND HOUSING CORPORATION

by

Andy Rowe
93 Bond Street
St. John's, NF

November, 1985

This project was funded by Canada Mortgage and Housing Corporation, but the views expressed are the personal views of the author(s) and no responsibility for them should be attributed to the Corporation.

TABLE OF CONTENTS

Page

INTRODUCTION

ACKNOWLEDGEMENTS

1.0 DESIGN 1
1.1 Introduction 1
1.2 The Design of the Instrument 2
1.2.1 The Inclusion of Rural Areas 2
1.2.2 The Coverage of High-density Multiple-unit Buildings 3
1.2.3 Interviewers' Evaluation of Structure 4
1.2.4 Respondents' Evaluations of Mechanical Items . 6
1.2.5 Cost Estimates 8
1.2.6 Coding 11
1.2.7 Other Areas 11
1.2.8 Summary: The Design of the Instrument 13
1.3 The Testing of the Instrument 15
1.3.1 The Testing of the French Version 15
1.3.2 The Testing of the Bottom End of the Scale ... 15
1.3.3 Summary: The Testing of the Instrument 17
1.4 The Sample Frame 18
1.5 The Manuals 19
1.6 Analysis 20
1.6.1 Thresholds 20
1.6.2 Summary Variables 21
1.6.3 Standardization 22
1.6.4 Summary: Analysis 24

2.0 THE MHCSP WORK PLAN 25
2.1 Introduction 25
2.2 Pilots 25
2.2.1 Pilots of the Instrument 27
2.2.2 Pilots of the Sample Frame 30

2.3 The Definition of Scales 31
2.3.1 Pictorial Representation of Indicators 35
2.4 Summary Variables 36
2.5 Summary 36

FOOTNOTES 38

APPENDIX A - DRAFT SURVEY INSTRUMENT (WITHOUT DRAWINGS)
APPENDIX B - SAMPLE ITEMS WITH DRAWINGS
APPENDIX C - DRAFT CODING OUTLINE

INTRODUCTION

The Municipal House Condition Survey Package (MHCSP) is designed to function as a complete survey and analysis package that municipalities can use to evaluate the adequacy of the housing stock in their jurisdiction. The MHCSP can be used to identify housing problems, help determine local objectives such as targets for the delivery of services, and can be an essential component of the delivery of residential rehabilitation assistance programs to municipalities. MHCSP will give most municipalities an opportunity to evaluate the condition of the entire local housing stock on the basis of a uniform, consistent methodology and -- equally important -- to evaluate that stock again after residential rehabilitation assistance programs or other initiatives have taken place. The use of MHCSP should result in the collection of reliable consistent data on housing conditions and thus in the more effective allocation and targetting of public funds devoted to the improvement and preservation of the housing stock.

The prime focus of MHCSP is the assessment of the physical condition of the housing stock. This is, of course, only one aspect of overall adequacy of the housing stock but it is a very important aspect, and the one that has posed the greatest challenge in terms of reliable, consistent measurement.

The MHCSP is based on the series of survey instruments for the evaluation of housing condition that originated in the Ottawa pilot study. The Ottawa pilot, conducted in 1981, was a major component of a Canada-U.S. cooperative project which examined physical house condition and rehabilitation need. The reports on the Ottawa pilot were funded and published by CMHC (readers can obtain these reports from the Canadian Housing Information Centre at CMHC). After the Ottawa pilot, a modified instrument was used in a number of other surveys: for example,

the Department of National Defence (DND) survey of base housing, the Department of Indian Affairs and Northern Development (DIAND) evaluation of reserve housing, and the RRAP evaluation survey. These surveys were reviewed in the development of the MHCSP instrument.

Although based on the Ottawa pilot, the MHCSP survey instrument represents a substantial improvement on previous instruments. The first of a second generation of survey instruments designed to evaluate housing conditions, MHCSP should make possible a relatively inexpensive, yet accurate and standardized evaluation of a dwelling's condition. It should also be possible to apply this instrument much more broadly than was possible with first-generation instruments, which are mainly inspector delivered and, therefore, expensive. The gains realized by MHCSP will assist the development of accurate, standarized, and occupant-delivered instruments -- the third generation of instruments.

This report has two chapters. In chapter one, the design issues involved in the development of MHCSP are analysed, and recommendations for resolving these issues are presented. In chapter two, the sequence of steps for producing the final version of MHCSP is discussed. The draft MHCSP survey instrument appears in Appendix A. Examples of the integration of drawings into the survey instrument are presented in Appendix B. A draft coding outline appears in Appendix C.

ACKNOWLEDGEMENTS

Responsibility for this report is the author's alone. However, the contribution of a number of people was essential. The Rehabilitation Skills Training Centre (RSTC) made time available under very pressing circumstances. Frank Pelley, of RSTC, defined the positions on scales and produced the drawings which appear in this report. His contribution was crucial and of exceptional quality. CMHC staff from the Residential and Community Improvement Division and the Research, Planning, and Evaluation Divisions all contributed to the work discussed in this report.

1.0 DESIGN

1.1 Introduction

The purpose of this chapter is to identify significant issues in the design of a Municipal House Condition Survey Package (MHCSP). The design is based on the assumption that the instrument and survey methods established in the Ottawa pilot provide the best basis for MHCSP. It is also assumed that the final product will strongly resemble the English House Condition Survey in coverage and format.[1] Finally, it is assumed that delivery will be through the municipality and that interviewers will have had no previous experience either in interviewing or in assessing the condition of dwellings.[2]

The review of the Ottawa pilot has included discussions with CMHC staff, a limited analysis of the results of the pilot, and a review of subsequent versions of the instrument (including DND and DIAND versions). Five categories of issue required attention:

- the design of the instrument
- the testing of the instrument
- the sample frame
- the manuals
- analysis

These categories are discussed in order in the remainder of this chapter.

1.2 The Design of the Instrument

The design of the MHCSP addresses seven concerns:

1. the inclusion of rural areas
2. the coverage of high-density multiple-unit buildings
3. interviewers' evaluations of structure
4. respondents' evaluations of mechanical items
5. cost estimates
6. coding
7. other areas (moisture, fire retardation, etc.)

1.2.1 The Inclusion of Rural Areas

The instrument must be modified before it can be applied in rural areas and in smaller communities. Although the DIAND instrument was obviously designed for rural areas, the modifications consisted primarily of developing an occupant-delivered instrument.

It is not difficult to design the major rural component, namely, water supply and waste disposal. However, there may be other components to consider, such as the condition of the road, the fouling of water by fertilizers or pesticides, support services available for those with special needs, and special moisture and safety problems (for example, because of greater use of wood heat). In addition, many items will require modification to suit rural structures, for instance, to allow for the absence of such components as a piped water supply or basement.

The present state of knowledge about the condition of rural dwellings in the southern part of Canada makes it difficult to determine which components to include or whether to enumerate all possibilities. It is, however, possible to use pilot tests

to develop an enumeration and a rough ranking of additional components.[3] This ranking can be created by using open-ended probes and a limited number of intensive interviews with rural residents. It is probably judicious to first enumerate the components internally within CMHC and to probe the frequency of their occurrence in pilot tests.

It is, therefore, recommended that:

- o septic/water items be developed
- o open-ended probes for the rural pilot
- o additional items be enumerated.

1.2.2 The Coverage of High-Density Multiple-Unit Buildings

Whether owned or rented, high-density multiple-unit buildings are structurally different from lower density buildings. Consequently, any structural examination requires an instrument different from that used for lower density buildings and specialized training of interviewers. It is unlikely that all inspectors will be able to identify structural problems with confidence unless a very detailed instrument and procedures for inspection are developed.

Most higher density structures are in the large metropolitan areas and are relatively new. These metropolitan areas have the ability to deliver a package for high-density buildings because the structures are inspected for compliance during construction. However, the design of a survey package is a specialized activity and may involve the development of an entirely new instrument. If this is the case, consideration should be given to alternative ways of developing a special instrument, since including a new instrument in MHCSP would delay the package considerably.

It is possible to examine the internal condition of the dwelling units and common areas with a suitably modified instrument. Like the instruments for examining lower density multiples, the MHCSP instrument can also be used for inspection of dwelling units in higher density multiples. Any urban pilots should be weighted to favour multiples if it is decided that the package should include them. This weighting should be part of the proposed pilot for the sample frames.

It is, therefore, recommended that:

- o all dwelling units regardless of building density be included
- o but only low-to-medium density buildings be included in the structural inspection

1.2.3 Interviewers' Evaluations of Structure

Since MHCSP is to be delivered by trained interviewers, interviewers' performance in the Ottawa pilot was evaluated. As is indicated in Table 1, performance was better for evaluations of the surface than for evaluations of structure. Although this finding is not surprising, improved performance in future applications of the instrument is desirable. This improvement is particularly important when training and delivery are distinct from design--as they will be in the MHCSP--and quality control is consequently much more difficult.

Two courses of action may be taken to improve the evaluation of structure: modify the instrument, or improve training. The report on the pre-test of the DIAND evaluation indicates that some attention might have been given to this issue, for the correlation for the structural components (summary only) improved considerably. Since the DIAND and

TABLE 1

Comparison of Interviewers' and Inspectors' Evaluations

Calculated from 1981 Ottawa Pilot data

Component	Correlation Coefficient
Interior surface	
Basement floor	.56
Basement walls	.45
Basement waterproofness	.42
Basement ventilation	.57
Floor surface	.45
Interior ceiling and wall	.51
Internal structure	
Basement support	.36
Basement joists and beams	.34
Wiring condition	.42
Floor surface	.29
Overall interior	.50
Exterior surface	
Wall surfaces	.52
Windows	.52
Roof	.52
Flashing	.41
Soffits and fascia	.60
Exterior structural	
Foundation	.40
Wall	.38
Chimney	.50
Roof	.33
Overall exterior	.60

Ottawa Pilot instruments are similar, it is reasonable to assume that improvement was due to training.

However, discussions with the contractor indicate that there was no special training on structures. Rather, it was suggested that the improvement occurred because the interviewers and households in the DIAND sample were more familiar with the structure of dwellings than those in the Ottawa sample. If this was indeed the case, familiarity could be simulated through training (where applicable). No component-by-component analysis is available for the DIAND pre-test, but the results bode well for an improvement in this area.[4] However, because MHCSP training is likely to be uneven, the instrument should be modified to improve evaluation of structure.

The following recommendations are, therefore, made:

- o priority be given to structural items in training and the instrument
- o performance of interviewers on structural items be carefully evaluated after the pilot tests.

1.2.4 Respondents' Evaluations of Mechanical Items

The evaluation of mechanical items has seemed to plague instruments based on the Ottawa pilot. The major problem seems to be the inability of trained interviewers to evaluate the furnace's condition, the type of wiring and its condition, etc. In addition, weighting mechanical components is controversial (see below). In both the DIAND and the Ottawa pilot, a few mechanical items were included in the household instruments; however, in general, mechanical items were in the inspector instruments.

The seven-point scale used in previous instruments does not seem particularly well suited to items such as the condition of wiring or of pipes. In these cases, the issue is essentially whether the item meets or fails to meet a given standard, that is, passes or fails (unless destructive examination is possible).

Unfortunately, the correlation of households' responses about mechanical items and inspectors' evaluations of the same items is rather weak (Table 2). There are situations, however, where poor correlations are easy to explain. For example, it is quite possible that a furnace in top condition from the point of view of life expectancy (boiler condition, etc.) might fail repeatedly because of some minor fault that can be easily corrected and does not contradict a top-condition rating.

The correlations on plumbing and electrical items are much more difficult to explain. For instance, if the household reports that the pipes continuously leak, one would expect an unfavourable rating for that mechanical component from the inspector.

It is not clear how to resolve this problem. It seems reasonable to argue that the household's reports are at least as accurate as the inspector's: the household has more experience with the items and a better vantage point from which to evaluate the component on a pass-fail basis than an inspector does on a seven-point scale or on a pass-fail basis.

It is, therefore, recommended that:

- pass-fail categories be used for mechanical items
- information on mechanical items be obtained from the respondent

TABLE 2

Comparison of Evaluations by Inspector and Household

Calculated from 1981 Ottawa Pilot data

Continuous Breakdown/Leak as Assessed by Household	Inspector's Rating of Condition 1 Top	2	3	4 Avg.	5	6	7 Replace
Furnace (with furnace cond)	1	1	0	0	1	0	0
Plumbing (with pipe condition)	2	7	4	1	1	0	0
Plumbing (with bath equip cond)	1	6	6	3	0	1	0
Electrical (with overall elec)	3	4	6	1	1	0	0
Electrical (with wiring cond)	3	4	4	2	1	0	0
Ceiling* (with roof structure)	0	3	7	3	3	0	0
Ceiling* (with ceiling cond)	2	3	4	1	4	0	2

Totally Replace/Poor Condition	Frequency of Breakdown/Leak as Assessed by Household 0	1	2	3	4	Continuous
Furnace	13	1	0	0	0	0
Water pipes	5	1	0	0	0	0
Bathroom equipment	6	0	0	0	0	1
Overall electrical	5	0	0	0	1	0
Wiring condition	4	2	0	0	0	0
Roof structure	10	0	0	-	-	-
Ceiling waterproofness	6	1	1	-	-	0

* Ceiling leak variable: one leak or more.

1.2.5 Cost Estimates

Estimates of the costs required to repair inadequate components are useful both locally and nationally. These estimates are also of considerable utility in establishing weights for components to be used in the construction of summary variables (see below). The authors of reports on the Ottawa pilot study included costs in their suggested modifications to the interviewer's instrument and thus must have felt that it would be possible for interviewers to evaluate the costs of repair. However, the Ottawa pilot's results point to the difficulty even inspectors have in obtaining consistent evaluations of costs and physical condition (see Table 3). Consequently, it is difficult to understand the authors' recommendations.

Given the results reported in Table 1, it is not surprising that the evaluations of interviewer and inspector differ so much. What is surprising is that there are such differences for the same inspector evaluating the same component twice: once for physical condition and once for cost.[5]

It is not clear whether these inconsistencies are due primarily to the evaluation of cost or to the evaluation of physical condition. That is, it is not clear which of an inspector's evaluations should be regarded as better.[6] The report on the Ottawa pilot did not examine this fundamental issue and simply used the inspector's evaluation of physical condition as the benchmark. However, it may be that the evaluation of cost should be the benchmark. This problem is serious because the standard used in the Ottawa pilot and in all subsequent versions has been the inspector's evaluation of physical condition.

TABLE 3

Comparison of Evaluations of Cost and Physical Condition
From 1981 Ottawa Pilot Data

Component	Correlation Coefficient: Inspector Physical/ Inspector Cost	Correlation Coefficient: Interviewer Physical/ Inspector Cost
Basement floor	.50	.27
Basement walls	.47	.20
Basement support	.50	.16
Basement joists and beams	.47	.01
Basement waterproofness	.35	.14
Wiring condition	.42	.14
Floor surface	.34	.25
Floor strucutre	.17	.02
Interior ceilings and wall	.56	.31

It has been suggested that since their experience is with evaluating costs (RRAP and appraisals), inspectors may be translating from cost to physical in preparing their evaluation of the physical. In discussions, inspectors who participated in the DND survey revealed that they did have difficulties understanding the seven-point scale and that they would be more familiar with costs or with the life expectancy of the component. It would seem an improvement to an inspector-delivered instrument to use the life expectancy of the component as the label on scales rather than the more abstract concept of condition used to date. This change would also help deal with standardization (see below). It should be noted that cost estimates were not used in the DND survey but were in the DIAND survey.

Because the inspections are to be done by interviewers whose training and field performance will be even less controlled than the training and field performance of those who participated in the Ottawa pilot, cost estimates should not be attempted in MHCSP. However, it is important that a system of weighting component results be developed to create summary variables. Thus cost is still of concern to MHCSP. It should be confirmed that the inspector's physical inspection is the appropriate standard for evaluating the performance of interviewers in the Ottawa pilot and DIAND pre-test. If their evaluations of costs are better, the appropriate evaluation of interviewers' performance is column 2 of Table 3 - not an encouraging situation.

It is, therefore, recommended that:

- costs not be estimated in MHCSP

- o further work be done on existing surveys to determine whether physical inspection is indeed the appropriate benchmark

1.2.6 Coding

Because MHCSP will frequently be administered by municipalities unfamiliar with the coding problems associated with complex survey instruments, careful attention must be paid to the coding of the MHCSP. The extreme consequences of inadequate attention to coding are shown in the DND survey where experienced coders were only able to code a maximum of six instruments per day.

It is, therefore, recommended that:

- o coding be a priority in the design of the instrument

1.2.7 Other Areas

As noted in the introduction, the central core of the MHCSP is the physical condition of the dwelling which is, of course, only one aspect, although a very important aspect, of overall adequacy. Several other components of a dwelling's condition could be considered. Many of these relate to the overall safety and adequacy of the dwelling.

Components discussed below relate to moisture and to safety, particularly fire safety (usually a concern of local government). However, there may be other areas local governments would like to address. A method of identifying and priorizing these areas should be established. Although the results might be a list too lengthy to accommodate, it is still possible to design items as optional supplements to the MHCSP for use by a municipality if it so chooses.

1.2.7.1 Household Characteristics

It is possible to economize on some of the items in the Ottawa pilot. For example, MHCSP can probably use income and life cycle to summarize household characteristics. Economy should be the objective for all components of the instrument, but there are greater opportunities to realize economies outside the physical inspection than elsewhere. In smaller communities, respondents are likely to know interviewers, thereby creating an additional incentive to use summary measures to reduce the potentially high refusal rate.

1.2.7.2 Moisture

There is a clear need to carefully consider moisture problems. This task will be particularly difficult because the survey will not be using inspectors and will probably be conducted in the summer, when moisture problems are most difficult to detect. It looks as if it will be possible to design items and training components that will overcome these problems. However, careful attention should be given to these items in the pilot tests.

1.2.7.3 Fire and Safety

Local governments are usually concerned about fire and safety considerations. These items should, therefore, be added to the instrument. In particular, fire separation and the chimney's performance should be examined. Unfortunately, it is difficult to evaluate fire retardation without a destructive inspection. Exits from buildings, fire extinguishers, smoke alarms, etc., should also be noted.

1.2.7.4 The Type of Dwelling

Because of the problem that questions on dwelling type have posed for the census, items that adequately describe dwellings must be developed. Since these problems are frequent in, but not limited to Quebec, a pilot should be conducted in Montreal to test the items on type of dwelling. The respondent's evaluation of the type of dwelling should be compared to the interviewer's and inspector's evaluation.

The following recommendations are, therefore, made:

- o items on moisture, fire retardation, exits, the chimney, and other safety items should be added to the instrument
- o additional areas of concern to the municipality should be identified and a priority list developed
- o a pilot in Montreal should test the items on type of dwelling

1.2.8 Summary: The Design of the Instrument

It is important that interviewers' evaluations of structure improve considerably. This should be the focus in the development of the instrument and of the training manuals. In addition, the household should be asked to provide information on mechanical items (on a pass-fail basis).

It must be determined whether the inspector's evaluation of cost or of physical condition is the superior standard in the Ottawa pilot. All of the MHCSP development work and the validity of results of previous instruments (such as the Ottawa pilot, DND, DIAND, and RRAP surveys) depend upon the answer to this question.

Adapting the Ottawa pilot for a broader application (to rural areas) does not seem a problem. Moreover, MHCSP can also adapt the pilot to cover a greater variety of types of dwelling.

1.3 The Testing of the Instrument

There are two issues in the testing of the instrument: testing the French version and testing the bottom end of the scale adequately.

1.3.1 The Testing of the French Version

The French version should be produced as soon as the issues relating to design are resolved. It would be optimal to use both French and English versions in any pilot: some occurrences may be more common in French-speaking areas and would, therefore, be overlooked in an English-only test. Such occurrences are likely to relate to types of structure and tenure.

It is, therefore, recommended that:

- o discussions take place with interested Quebec ministries on structural and rural differences
- o there be a pilot test in Montreal in the french language

1.3.2 The Testing of the Bottom End of the Scale

The pilot and pre-tests of MHCSP should be weighted towards the bottom end of the scale both in the selection of sample area and in sample selection. The principal objective of this package is to evaluate the condition of the housing stock. However, the Ottawa pilot contained very few dwellings that were likely to be ranked towards the absolute bottom of the scale.

Subsequent versions, particularly the DIAND survey, obviously included poorer quality dwellings. However, none of the versions which have been developed have been applied to the

entire range of housing stock conditions. Although the DIAND survey contained many poorer quality dwellings, it cannot also have had many dwellings in the upper levels of the scales.

Therefore, to identify components of the stock that need attention, dwellings and dwelling components that rank towards the bottom of the scale should be well represented.

It is, therefore, recommended that:

- o the pilot and pre-tests be weighted towards the bottom end of the scale and be conducted in areas where the full profile of dwelling condition is present.

1.3.3 Summary: The Testing of the Instrument

The French version should be produced as soon as possible after the instrument is designed, and there should be a pilot test in Montreal. The rural pilot and the Montreal pilot should be weighted towards the bottom end of the scale of dwelling quality to fully test the range of the component scales.

1.4 The Sample Frame

Each municipality will have to establish a universe of dwellings to sample. Municipalities will need direction from a complete instruction manual detailing listing and sampling procedures. It will, therefore, be necessary to know what universe is available to each municipality. The universe is likely to come from either the land registry or assessment records. For example, in the Maritimes, the Land Registration Information Service (LRIS) system is available for each municipality. However, for some municipalities, the LRIS coding may not correspond to political boundaries, and for some of the larger communities (for example, Saint John) subdivision is difficult. Outside the Maritimes (for example, in Manitoba), assessment records are more suitable. Newfoundland will be a problem because of the unusual land registry system and the absence of centralized assessment records.

Opportunities will have to be explored in each province, probably through departments of municipal affairs. It must be emphasized that this step is crucial to the successful design of MHCSP and that considerable work is required before a package can be designed. Discussions with the Appraisal Institute of Canada have only confirmed that this task alone is a major undertaking; fortunately, it is also one that is welcomed.

The following recommendations are made:

- an inventory of possible universes for each province be established
- possibilites for sampling be investigated
- sample frames be pre-tested

1.5 The Manuals

At least three manuals will be required for MHCSP: the sampling, training, and analysis manuals. The training manual should probably be accompanied by a slide/tape or video component. All three manuals can be grouped into one larger municipal manual.

A decision will have to be made about the responsibility for data processing. The instrument has been designed so that even hand processing by small municipalities is possible. There are obvious advantages, however, to central processing. A decision on this issue is required before the analysis manual is produced.

It will be necessary to develop the training manual before the Montreal and rural pilot tests. The sampling manual will be produced by a separate sampling pilot (recommended in the following chapter). The analysis manual will be produced after the pilot tests are concluded and will use results from the pilot tests. The timing of manual production is included in the work plan presented in the following chapter.

The following recommendation is made:

- responsibility for data processing be assessed

1.6 Analysis

There are three important analytic issues: thresholds, summary variables, and standarization. To a certain extent, the issues of threshold and summary are related. The threshold issue arises with respect to the application of standards such as the RRAP standards to the results. The issue of summary variables is more general and raises the problem of establishing weights for individual components.

1.6.1 Thresholds

In the MHCSP, the issue of thresholds can arise in the application of national standards (such as the RRAP standards) or of a local standard (local life safety standards, external appearances for royal visits, etc.). In the case of local standards, it is up to the municipality to determine the scalar interpretation of their standards; however, municipalities will obviously be guided by the positioning of national standards. To assist municipalities, a life safety standard should also be applied to MHCSP.

It is essential that staff, knowledgeable in the application of the RRAP standards, be involved in the development of all elements of the package. Their first responsibility should be to apply the RRAP standards to the component and overall scales and to the summary scales; they should then participate in the development of the training manuals and the analysis of the results from the pilot.[6]

The following recommendations are, therefore, made:

- use RRAP "shall" items as thresholds
- RRAP staff should be responsible for locating thresholds

- o RRAP staff should evaluate pilots for the effectiveness of thresholds
- o develop a threshold for life safety standards

1.6.2 Summary Variables

The Ottawa pilot contains overall variables directly estimated by evaluators and summary measures constructed from relevant components. Limited analysis of the summary variables used in the Ottawa pilot has been conducted.

It was argued that in the absence of any better theoretical weighting, an equal weighting of components should be used in the Ottawa pilot and elsewhere in subsequent applications of the instrument. Although this argument may be true as far as it goes, it is clearly unsatisfactory to continue to use equal weighting in this fashion for the MHCSP. It would be very difficult to explain to a local building control officer that plumbing fixtures and basement structure should have the same importance in a summary measure. However, a summary measure of some type is essential if municipalities are to be able to use the results of the MHCSP. It is imperative that either a system of weights be developed or that alternative measures be adopted. A further option is to separate components into clusters where equal weighting can be used.

When the DND results become available shortly, it will be possible to do further analysis of weightings. Unfortunately, the DND survey did not estimate costs; the opportunities for weighting are, therefore, rather restricted.

It was noted above that there is considerable uncertainty about the results on costs in the Ottawa pilot and that it is not clear whether the problem lies with the evaluation of physical condition or with the estimates of costs. It was also

pointed out that this important issue should be considered before the MHCSP designs are completed. The related issue of weights for the summary variables is an added incentive to consider this question.

The following recommendations are, therefore, made:

- o weighting in the Ottawa pilot and DND results be explored.
- o the possibility of aggregating system components on the criterion that they are equally weighted be explored.

1.6.3 Standardization

The problem of standardization arises whenever there is much variation in the universe or in the delivery of an instrument. Standardization is a serious issue in MHCSP. Simply put, the question is, what is an Ottawa 4 in St. John's? Standardization concerned the inspectors involved in the DND stock in any national context who said that a 4 on the DND scale was relative--a 4 in reserve housing would be very different!

There are two opportunities to effect standardization in the MHCSP: during training and in the instrument. Opportunities in training are more limited than opportunities in the instrument. Since there is unlikely to be much control through supervision once the package is in the field, standardization must be realized in the instrument itself. This is a complex and difficult problem because of the variation in the stock and because of the lack of control in both training and field supervision.

Fortunately, there are some encouraging avenues to explore. A Texas survey used photographs on the instrument itself to describe the specifics of the items in the instrument. This

approach is very precise, but because of the variation in the stock to which the MHCSP will be applied, a development effort would be needed to produce the instrument. This development would, in effect, be a further refinement of the Ottawa pilot and would advance the art of assessing the condition of dwellings considerably.

RRAP staff were asked to photograph dwellings during their pretesting; unfortunately, only overall site photographs were produced. However, discussions with the Rehabilitation Skills Training Unit were more encouraging. It is clear from their experience that single photographs or drawings must be used for each item described; that is, no picture can contain more than one problem or degree of problem. This assumption means that about 15 component faults (cracks, buckling, etc.) will have to be drawn and that three pictures will be needed to identify positions on the scale. Up to 100 pictures may be required (they will also be necessary in the development of the training packages).

Many descriptions used in the past lack precision. For example, in both training and application, references to unsoundness must be accompanied by a precise definition or photograph. The use of pictures on the instrument or in an accompanying manual is really only a small step that extends the necessary training materials to the interview itself.

The precision and consistency of component items should also be improved. First, the criteria for the selection of components should be clearly specified. In the MHCSP, there are two criteria: <u>structural function</u> and <u>weather envelope.</u> All components and indicators of failure are selected and described according to these criteria. Second, the format of the items should be improved. The system used in the MHCSP is to group

components by function (structural or envelope) where possible, identify the component, and then list all the indicators to be considered. These indicators are themselves standardized into approximately 20 sets of photographs or drawings in the interviewer's field manual.

Finally, it was suggested at the DND briefing that life expectancy of the component or dwelling provides a standard that could be used in the instrument. This possibililty should be explored further but would apply only to instruments delivered by inspectors.

The following recommendations are, therefore, made:

- o pictures for component scales be obtained
- o scales in pilots be supplemented by pictures
- o pilots be used to evaluate the relative effectiveness of placing pictures on the instruments or in a separate manual for interviewers
- o structure and weather envelope be criteria for the selection, organization, and description of components
- o a highly standarized format for dwelling components be developed

1.6.4 Summary: Analysis

The three analytic issues are the most problematic to the successful production of MHCSP. Fortunately, the three issues need not all be resolved before the development of the instrument, but each has a role in the production of the entire package. The resolution of each issue must be coordinated with the timing of the entire package if serious problems and bottlenecks are to be avoided. For example, the issue of the threshold must be resolved in time to examine the results of the urban and rural pilot tests; the issue of standardization, before the pilots so that the techniques can be evaluated.

2.0 THE MHCSP WORK PLAN

2.1 Introduction

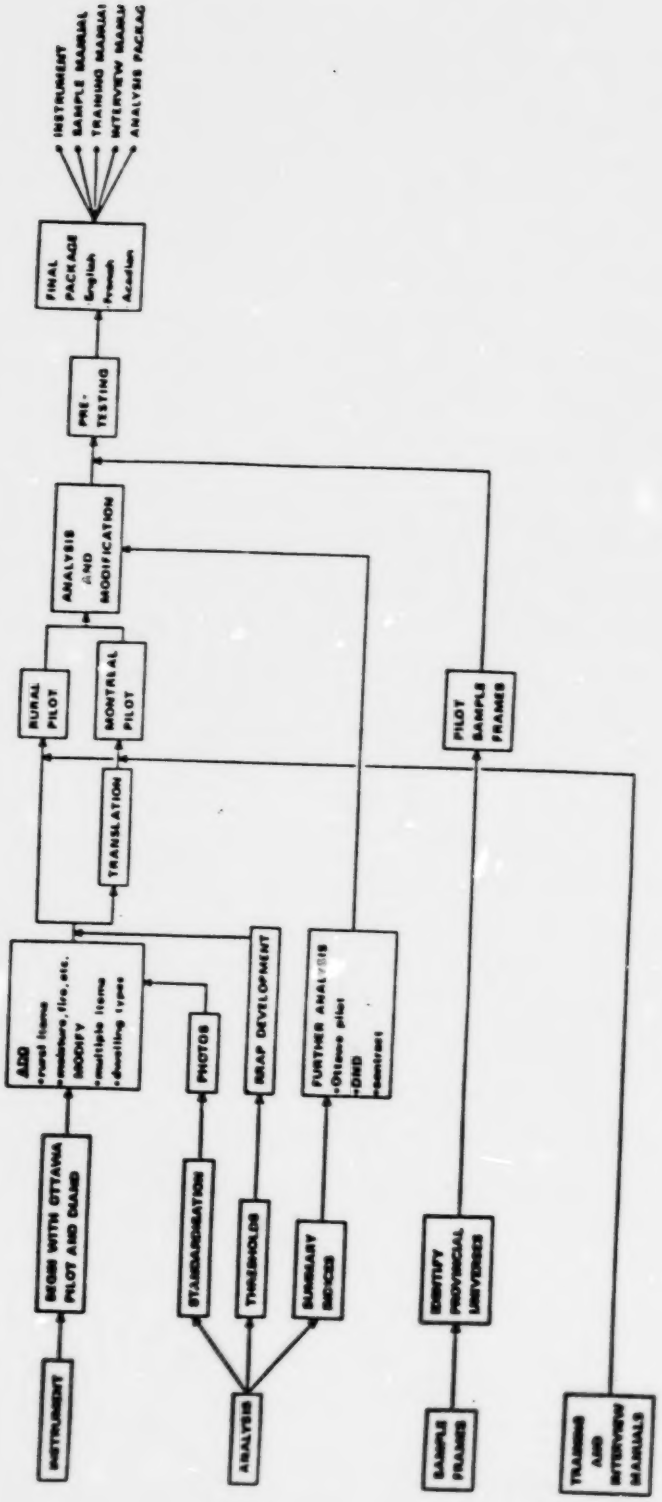
Three separate proposals are identified in the work plan shown in Figure 1: proposals on pilots (three proposed), the use of pictorial scales to further standarization, and summary variables (including the work to verify physical inspection as the benchmark for the Ottawa pilot). In this chapter, the objectives, proposed work methods, time requirements, and, where applicable, budgets of the three proposals are discussed. The development of picture-assisted scales and of summary variables is also discussed in this chapter.

All of the tasks identified in the third column of the flow chart in Figure 1 have been addressed, including the issue of summary variables. The instrument requires further structuring and cleaning which can be completed as part of any modifications to suit the design of the pilot test and the ultimate objectives of the MHCSP. In addition, the pictorial representation of the indicators for the component scales has been roughly decided. The representations thus require only final production to be ready for use in field manuals in the pilots. Note the production of field manuals and training materials for the pilot tests was not part of the tasks of this phase of the MHCSP development project.

2.2 Pilots

Three pilots are necessary to appraise and develop the survey instrument and to develop the sample frames. The instrument should be tested in the french language in Montreal to develop the items needed to identify the type of dwelling and to develop items that will evaluate the rental portion of the stock. An English version should be tested in a rural area or

Figure 1
The Work Plan for MHCSP



small town to develop the additional items designed to measure these areas' water supply, sewage disposal, special moisture problems, etc.

MHCSP will also have to pilot the sample frames, which must be developed for each province. There is likely to be considerable variation among provinces and it may, therefore, be necessary to test this third pilot in several locations.

2.2.1 Pilots of the Instrument

The two proposed pilots of the instrument--Montreal and a rural area--have different objectives but are both necessary to the design and development of the instrument. The basis of the instrument is the instrument of the Ottawa pilot study and modification of that instrument for the DIAND evaluation.

The Ottawa pilot was exclusively an urban study; the DIAND pilot was exclusively rural area or small town. These pilots form a good basis for the MHCSP, which is designed to operate in all locations. However, since the Ottawa pilot and the DIAND instruments were separate, the pilots did not have to confront a number of issues common in a single, multi-application instrument. Most important, these pilots do not have to deal with standardizing among different types of location and among different clusters of dwelling quality. In addition, the base instruments did not address the problem of higher density multiples, nor did the base instruments try to provide a flexible threshold (which is desirable for a package such as the MHCSP).

Consequently, a number of fundamental issues must be addressed before an instrument can be pre-tested. The two proposed pilots are intended

- to consolidate past gains in the development of instruments realized in the Ottawa pilot

- to incorporate and test techniques of standardization and format developed specifically for the MHCSP and which will represent a significant advance in the evaluation of a dwelling's physical condition

- to develop items that will realize gains in other areas, such as moisture, that were not as far advanced at the time of the Ottawa pilot

- to test expansion of coverage to include the entire housing stock exclusive of mobile homes and reserve housing

- to test the validity of occupants' evaluations using the MHCSP instrument

- to test alternative approaches to dwelling type items.

2.2.1.1 The Montreal Pilot

Montreal is considered the most suitable site for the urban pilot because it has presented the greatest problems to dwelling type items in the past, is well suited to cluster sampling, will test the French version of the instrument, and contains the full range of building densities that will be encountered in any urban area of Canada.

The Montreal sample should be as tightly clustered as possible. It should be stratified to ensure coverage of low, medium, and high densities (limits still to be defined) and be weighted towards dwellings of poorer quality. There would thus be 6 cells in the sample frame and at least 30 units plus the

usual allowances for refusals and other problems would be necessary. There should thus be at least 50 units in the Montreal pilot; however, to be safe, a sample size of 100 units is recommended. Since most of the costs are front-ended (in training), this doubling of the sample size will not significantly increase costs.

Because of the small number of interviews, training costs are going to be high relative to the total cost of the pilot. Consequently, an expansion of the sample size would not be expensive should it be desired. An estimated cost of $120/interview is used (on the advice of the Statistical Servicies Division) in costing the Montreal pilot because of the high front-end costs. A one-hour face-to-face interview is also assumed.

In addition to the interviewer's inspections, it is necessary to obtain a benchmark by which performance can be evaluated. It is thus necessary to have additional inspections by an expert (either a CMHC inspector or a surrogate, such as a carpenter or contractor experienced in renovation). It is not necessary to obtain benchmark inspections for each unit. However, benchmarks should be obtained for each interviewer. If no more than five interviewers are used, it will probably be satisfactory to limit the benchmark inspections to 20 percent of the interviewer's inspections. If there are 20 expert inspections and three can be completed per person-day, two person-weeks (including training) will be needed to obtain the benchmark.

If a contractor charges overhead at 50 percent and provides only the completed schedules and a data tape, the estimated costs of the Montreal pilot are as follows:

Interview costs	$12,000
Overhead	6,000
Inspections	3,000
Total Costs	$21,000 (1985 dollars)

2.2.1.2 The Rural Pilot

The rural pilot is a necessary part of the development of rural instrument items for the final instrument and for the development of the standarization procedures to be used in the MHCSP. The rural pilot should be stratified and weighted in a fashion similar to the Montreal pilot. However, instead of different building densities, different strata of population densities should be used. As for the Montreal pilots, it is expected that there will be six cells, thus necessitating a sample of about 50 units (a 100-unit sample is recommended for safety). Most of the cost is front-end cost regardless of sample size.

The sample should also be weighted towards poorer dwellings and be as clustered as possible. However, clustering will be limited because of the requirements of the population density strata. The rural pilot is thus likely to be somewhat more expensive that the urban pilot. Furthermore, because of the wider geographic distribution of the sample, inspections are expected to cost more.

The Maritimes are likely to provide a suitable site for this pilot. It is easier to obtain a selection of clustered population density strata in that region and be confident that the clusters will contain a reasonable number of poorer quality units than it is elsewhere in the country. The selection of a location should be a function of the choice of contractor so

that travel costs for the training sessions are minimized. Estimated costs for the rural pilot are presented below.

Interview costs	$15,000*
Inspections	6,000
Total costs	21,000 (1985 dollars)

* IPA estimate includes overheads.

2.2.2 The Pilots of the Sample Frame

It is necessary to be very precise in the sampling manual provided to the municipalities. Consequently, it is essential that the procedures used to identify the universe and draw a sample be well tested and operational for every area where the package will be applied. Unfortunately, the procedures for assessment vary considerably by province and frequently by areas within a province.

Once the possible universes for different areas in each province and sampling procedures have been designed, they should be tested wherever there may be problems. Problems are likely to occur in one or two types of location in a few provinces. The objective is to develop concrete procedures for the sampling, and these procedures can be developed only through a trial-and-error pilot.

Until it is possible to enumerate the types of problems likely to be encountered and the number of areas in which they are likely to occur, it is difficult to estimate the costs of this pilot. However, unlike the urban and rural pilots, the testing of the sample frame can be conducted entirely by CMHC branch offices. This pilot could probably be completed in two person-months with a suitable employee.

2.3 The Definition of Scales

A major development of the MHCSP is the increased precision, flexibility, and standardization in the measurement of a dwelling's condition. These accomplishments have been made possible by a systematic structuring of the components of condition, the use of pictorial illustrations of positions on scales, and the specification of the criteria to use in the evaluation of each component.

Components or systems of a dwelling are intimately linked, and a failure in one will affect others. One of the important achievements of the Ottawa pilot was the demonstration that inspections of the basement and exterior are satisfactory indicators of a dwelling's condition. This finding has intuitive appeal because we know that these components perform the most important system functions - structure and weather envelope. The MHCSP extends sthis logic and identifies the function of the component (structural or envelope) as the basis for evaluation. These functions are also used as a basis for creating summary variables.

The evaluation of the basement is a useful illustration of this approach. The MHCSP clearly identifies three components whose functions are structural (wall, supports, and carrying members) and instructs the inspector to evaluate these components according to specific indicators of failure of function (cracks, leaning, etc.). The MHCSP then asks the interviewer to evaluate the evidence of the presence of water on the floor and walls according to specified indicators. This evalution assesses the performance of the basement in its envelope function.

The MHCSP produces three summary variables using information on the basement. By contrast, the Ottawa pilot

produced one summary variable by adding measures of the performance of the various components of the basement and weighting them equally. This methodology confused functions and probably used incorrect weights. The MHCSP summary variables are designed to indicate the basement's performance of specific functions, whereas the Ottawa pilot's summary variable was designed to rate the overall performance of the entire basement. But basements do not have an overall function; rather, they have several interlinked, specific functions. MHCSP's specification of the function of the dwelling's components is an important development in obtaining more precise and accurate evaluations from untrained interviewers. Unlike building inspectors, untrained interviewers are not familiar with the different functions of dwelling systems. MHCSP's specification also facilitates the development of summary variables.

Once the function of the component to be inspected has been identified, a number of indicators are listed in the instrument. These indicators are then described for different materials. Consequently, the routine for every component is the same--function, component, indicator, description of indicator. Moreover, the number of indicators is limited, and the indicators are usually much more specific than was the case in the Ottawa pilot. For example, unsoundness is replaced by indicators such as decay/rot. These improvements should increase the effectiveness of the instrument.

Indicators are described both verbally and pictorially. In the Ottawa pilot, positions on scales were descriptive adjectives, such as <u>top condition</u> or <u>totally replace</u>. Such descriptions are too vague to be of much use to untrained interviewers and are also unsuitable for use by inspectors. In the MHCSP, positioning on scales is by function; the top end of the scale (1-2) refers to a component's performing its function correctly, and the bottom end of the scale indicates total

failure of function. The description of the positions must be assessed after the results of the pilot are available. The definitions used to produce the pictorial representations are as follows:

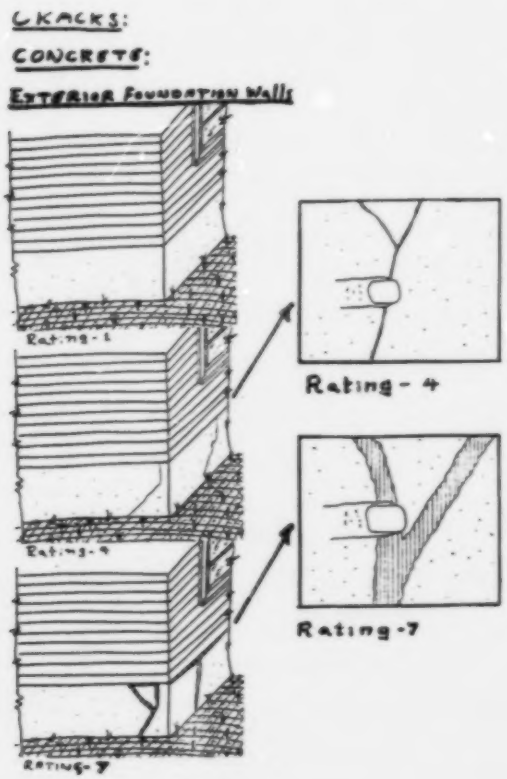
1. correct function--top condition
2. correct function--some wear and tear
4. functioning--needs minor repair
6. functioning seriously impaired--needs major replacement
7. total failure of function--total and immediate replacement

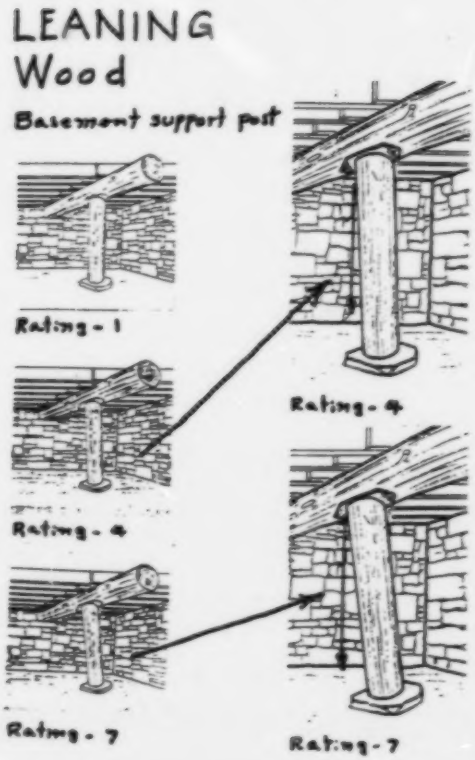
As noted before, photographs were used with some success in a survey of the condition of dwellings in Texas. Photographs provide the best means of standardizing the MHCSP instrument, in which there is little control over training or administration in the field. Obviously, photographs are cumbersome and potentially expensive. Reproduction also presents technical problems. However, drawings seem a reasonable alternative. They are much less expensive to produce and reproduce and are much more flexible because they can be designed for the specific situation.

Describing each component with pictures would create a complex and cumbersome package. A more desirable and effective alternative is to describe each indicator (for example, cracks or crumbling) with pictures and be economical and precise in the naming and use of the indicators. With this approach, no more than 15 indicators will have to be represented. Each will require three representations: for the 1, 4, and 7 positions on the 7-point scale. However, separate drawings must be made for each indicator where materials differ. For example, the appearance of a crack and the crack's seriousness--and therefore the representation on the scale--depend on whether the crack is in concrete or brick.

An illustration of pictorial scales developed for the MHCSP is presented in section 2.3.1.

2.3.1 Pictorial Representation of Indicators





2.4 Summary Variables

The problem with summary variables has been discussed (see section 1.6.2). Fortunately, it is not necessary to decide on weighting until the pilot returns are analysed. The main implication of failing to develop the summary variables until this time is that the production of the final version of the MHCSP might be delayed.

It is important that summary variables be produced because they provide the only check on overall ratings by the interviewer and thus are the best way of verifying results. In addition, municipalities require a summary measure for each dwelling to assist in allocation and targetting decisions.

In an effort to resolve this problem, the outline of the MHCSP coding contains six summary variables (basement perimeter structure, basement interior support, basement envelope, structure of attachments, exterior weather envelope, and roof weather envelope). These variables were produced by clustering component variables that addressed the same function and dwelling area and for which an equal weighting seemed reasonable. This issue is discussed further in Appendix C, in the outline of the coding.

An overall summary variable for the dwelling's structure is also produced. This variable is an average of all the summary variables except that for attached structures.

2.5 Summary

In this chapter, how major problems identified in chapter one have been resolved has been described. It has been recommended that three pilots be undertaken as part of the fundamental development work of a survey package to measure the

condition of dwellings. These pilots -- the Montreal and rural pilots and the pilot work on the sample frames -- still fall into the category of basic development work. Once the pilots are complete, the results analysed, and the package suitably modified for pretesting, the basic development stage will be complete.

FOOTNOTES

1. English House Condition Survey, Department of the Environment, HMSO, 1976, London.

2. Discussions with RRAP staff reveal that they have been assuming that the package will be delivered by RRAP agents. The latter approach calls for a somewhat different package, which can be achieved through minor modifications of the MHCSP; on the other hand, a package designed for delivery by RRAP agents would be much more difficult to modify for inexperienced agents.

3. Pilot tests should be distinguished from pre-tests. Pilot tests are designed to further develop the instrument by obtaining additional information, testing frequency of occurrence of times, etc. Pre-tests are used to test the smooth operation of instruments once they are established.

4. Subsequent to the writing of this report, Ekos have confirmed that some of the evaluations of structural components in the DIAND survey were more successful than the Ottawa Pilot.

	OPS	DIAND
Floor surface	.45	.63
Wall surface	.52	.61
Foundation	.40	.60
Wall	.38	.45
Doors and windows	-	.62
Attached structures	-	.65

Since the first generation instrument has been used by Ekos for almost five years, it can be assumed that these (incomplete) DIAND results represent the upper limit of the potential for the first generation instruments.

5. When the results reported above are controlled for area of the dwelling, there is no significant improvement in correlation.

6. This is also the situation in the case of the differences in evaluations of mechanical systems reported above.

7. As a consequence of the DND survey, 22 CMHC inspectors, with considerable experience in the MHCSP-like evaluations are located in all regions. Six field supervisors were met at the DND debriefing, and they seem most competent and interested in future surveys. These personnel are an invaluable asset to the MHCSP initiative during both design and implementation.

APPENDIX A

DRAFT SURVEY INSTRUMENT
(WITHOUT DRAWINGS)

1.1 Do you or does some member of your household own or rent this dwelling?

Own .....1 (Go to 1.3)
Condo ....2 (Go to 1.3)
Coop .....3 (Go to 1.3)
Rent .....8 (Go to 1.2)
Dk/Nr ....9 (Go to 1.2)

1.2 Which of the following best describes who does own the dwelling?

Other Relative 4
Landlord 5
Government 6
Other 7
Dk/Nr 9

This next group of questions is concerned with things such as when you first occupied the dwelling, need for repair in the dwelling and certain characteristics of your dwelling such as size.

1.3 In what year do you think that this building was built? (As close as you can estimate)

Year _1_/___/___/___/
Dk/Nr ___/___/___/___/

1.4 In what year did your family move into this dwelling?

Year _1_/___/___/___/
Dk/NR ___/___/___/___/

1.5 Is this dwelling in need of

YES, major repair (defective plumbing or electrical wiring, structural repairs to walls, etc.) .1
YES, minor repairs (missing floor tile, bricks or shingles, steps, etc.) ...2
NO, only regular maintenance needed (painting, furnace cleaning, etc.) .3

1.6 How many rooms are there in this dwelling? (Do not count bathrooms or kitchens).

Number ___/___/
Dk/Nr ___/___/

1.7 What is the length of this dwelling?

Metres ___/___/
Or Feet ___/___/
Dk/Nr ___/___/

1.8 What is the width of this dwelling?

Metres ___/___/
Or Feet ___/___/
Dk/Nr ___/___/

1.9 Do you have smoke or fire detectors in your dwelling?

Yes .....1 (Go to 1.10)
No .....2 (Go to 1.11)
Dk/Nr ...9 (Go to 1.11)

1.10 Is at least one of them presently working?
Yes 1
No 2
NA 8
Dk/Nr ...9

1.11 Does your roof or ceiling leak when it is raining?
Yes 1
No 2
Dk/Nr ...9

The problems created by moisture in dwellings are becoming an increasing concern and the following questions are directed towards evaluating the presence of moisture problems in housing.

1.12 Have you ever noticed excessive condensation, fogging or frost on your windows?
Yes 1
No 2
NA 8
Dk/Nr ...9

1.13 Have you ever had to wipe up dripped water from your windows?
Yes 1
No 2
NA 8
Dk/Nr ...9

1.14 Have you ever noticed any water damage such as stains, peeling wallpaper or loose material around your windows?
Yes 1
No 2
NA 8
Dk/Nr ...9

The following three questions refer to closets which are located on the exterior walls of your dwelling.

1.15 Have you ever noticed if closets on exterior walls are cold?
Yes 1
No 2
NA 8
Dk/Nr ...9

1.16 Have you ever noticed frost or condensation on the exterior wall of closets?
Yes 1
No 2
NA 8
Dk/Nr ...9

1.17 Have you ever noticed water marks, mould or mildew on the exterior wall of closets?
Yes 1
No 2
NA 8
Dk/Nr ...9

1.18 Have you ever noticed water or water marks on your ceilings or walls?
Yes 1
No 2
NA 8
Dk/Nr ...9

The remainder of this section attempts to evaluate the condition of the mechanical systems in dwellings, that is, things like chimneys, electrical and plumbing systems, and heating. When answering these questions we hope that you will distinguish between problems which are caused in all of our homes when we don't use something quite correctly (like plugging toilets by putting unsuitable material down them) and problems caused by the condition of the system (like fuses blowing because you don't have enough electrical outlets and have to double up on certain sockets).

1.19 Have the chimneys you use been relined or replaced?

Yes (year) ___/___/___/___
No 2
No Chimney 8
Dk/Nr 9

1.20 Have these chimneys been cleaned within the last year?

Yes 1
No 2
No Chimney ..8
Dk/Nr ...9

1.21 How often are your cleaned?

Less often than once per year .0
Once per year 1
Twice per year 2
More than twice per year 3
No chimney 8
Dk/Nr 9

Heating System

1.22 What is the main type of heating fuel used in this dwelling? (In terms of providing the most heat during the winter.)

Oil 1
Electricity ..2
Piped Gas 3
Propane 4
Wood 5
Other 6
Dk/Nr 9

1.23 What is the second most important type of heating fuel used in this dwelling? (In terms of providing the most heat during the winter.)

Oil 1
Electricity ..2
Piped Gas 3
Propane 4
Wood 5
Other 6
Dk/Nr 7

1.24 What is the main type of heating equipment used in this dwelling? (In terms of providing the most heat during the winter.)

Steam or hot water furnace 1
Forced hot air furnace 2
Space Heater 3
Installed Electric Heating 4
Cooking Stove 5
Heat Stove 6
Other (fireplaces, etc.) 7
Dk/Nr 9

1.25 How many times in the past six months has your heating system failed in situations where you do not feel the cause was unsuitable use?

None at all ..0
Once 1
Twice 2
Three times ..3
Four times ...4
Often 5
NA 8
Dk/Nr 9

Plumbing System

1.26 What kind of sewage disposal facilities do you have?

Piped Sewage Disposal 1
Septic Tank 2
Chemical 3
Other 4
None 5
Dk/Nr 9

1.27 How many times in the past six months has your toilet backed up or clogged in situations where you do not feel the cause was unsuitable use?

None at all ..0
Once 1
Twice 2
Three times ..3
Four times ...4
Often 5
NA 8
Dk/Nr 9

1.28 From where do you get your water?

Central piped water system 1
Piped from own source 2
Well (not piped) 3
Other (specify) 4
Dk/Nr 9

1.29 How many times in the past six months has your water supply failed?

None at all ..0
Once 1
Twice 2
Three times ..3
Four times ...4
Often/On Many Occasions ..5
NA 8
Dk/Nr 9

1.30 If you are using one water outlet such as a faucet and flush a toilet or run water from another second point, how is the water flow affected?

No effect 1
Slows slightly 2
Slows significantly 3
NA 8
Dk/Nr 9

1.31 Do you have galvanized pipes anywhere in your plumbing system?

Yes 1
No 2
NA 8
Dk/Nr ...9

Which of the following plumbing facilities do you have?

	Yes	No	Dk/Nr
1.32 Kitchen sink	1	2	9
1.33 Water heater	1	2	9
1.34 Bathroom sink	1	2	9
1.35 Bath or shower	1	2	9

1.36 How many times in the past six months has your water system (including pipes, applicances, heaters, etc.) leaked so badly that you had to mop it up or place a bucket below the leak?

None 0
Once 1
Twice 2
Three times ..3
Four times ...4
Often 5
NA 8
Dk/Nr 9

Electrical System

Are there enough electrical outlets in the following rooms so that you don't have to use extension cords or more than one applicance per outlet?

	Yes	No	NA	Dk/Nr
1.37 Kitchen?	1	2	8	9
1.38 Eating area?	1	2	8	9
1.39 Living room?	1	2	8	9
1.40 Bedrooms?	1	2	8	9
1.41 Work rooms?	1	2	8	9
1.42 Other areas?	1	2	8	9

1.43 Are there any fuses which blow or circuits breakers which trip often?

Yes ...1
No ....2 (Go to 1.49)
NA 8
Dk/Nr .9

In which area do they blow or trip often?

	Yes	No	NA	Dk/Nr
1.44 Kitchen	1	2	8	9
1.45 Eating area	1	2	8	9
1.46 Living room	1	2	8	9
1.47 Bedrooms	1	2	8	9
1.48 Work rooms	1	2	8	9
1.49 Other areas	1	2	8	9

Our concern now is with the characteristics of the occupants of this dwelling. We will be asking you 6 questions only and they will be about things like the number of persons living here and special needs you might have. We would like to remind you that all information you give is strictly confidential and there is no way anyone can obtain any details about your household.

2.1 How many people are there usually living in this dwelling?
Number /___/___/
Dk/Nr /___/___/

2.2 How many of these people are
5 years of age or less /___/___/
between 6 and 18 /___/___/
between 19 and 65 /___/___/
over 65 years of age /___/___/

2.3 How many families are there usually living in this dwelling?
Number /___/___/
Dk/Nr /___/___/

2.4 Is there anyone living here who is blind, deaf, or has difficulty in moving around the dwelling?
Yes ....1 (go to 2.5)
No .....2 (go to 2.6)
Dk/Nr ..9 (go to 2.6)

2.5 Is the dwelling suited to any special needs they may have as a result of their disability?
Yes 1
No 2
NA 8
Dk/Nr ...9

2.6 In which income category would your total earned household income fall?
Less then $7500 per year 1
$7501 to $13,000 per year 2
$13,001 to $23,000 per year ...3
$23,001 to $30,000 per year ...4
$30,001 to $40,000 per year ...5
More than $40,001 per year 6
Dk/Nr 9

We would now like to inspect a limited number of interior dwelling characteristics which we have found in the past are very useful in telling us about the overall condition of your dwelling. This will involve us going into your basement to look at the condition of your foundation walls and support system and for a limited number of dwellings, peeking into your attic space. Most of the physical inspection is conducted from the outside so that we will only be in the basement for a few minutes.

For pitched roof rental row building and large converted singles only; ask respondent if they have access to the roof space and if so if you can examine it in order to see if there is a physical separation between dwelling units.

3.1 Is there fire separation between units?

Yes 1
No 2
NA 8
Dk/Nr ...9

3.2 Is all or part of the basement included in your dwelling unit?

Yes .....1 (proceed)
No .....2 (go to 5.1)
Dk/Nr ...9 (refer to guide)

Ask if the basement or crawl space is accessible for inspection.

Yes (go to 4.1)
No (go to 5.1)

Interviewer will now explain the physical inspection and ask permission to inspect the basement.

Rate the ability of the following three components (items 4.1 to 4.3) to perform their structural functions.

4.1 Rate the interior basement walls in terms of

- crumbling
- cracks
- missing materials
- leaning
- decay/rot

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___

4.2 Rate the support posts or centre columns in terms of

- leaning
- decay/rot
- crumbling
- missing materials

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___

4.3 Rate the joists and carrying beams in terms of

- cutting and notching
- decay/rot
- missing materials
- sagging
- cracks

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___

4.4 Rate the evidence of water presence in the basement or crawl space in terms of

- water marks
- mildew
- standing water

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___

4.5 Is there a drain or a sump pummp on the basement floor?

Yes 1
No 2
Dk/Nr ...9

4.6 Is there a furnace in the basement?

Yes 1
No 2
Dk/Nr ...9

Thank the respondent for their co-operation. Explain that the rest of the inspection is done from the exterior of the dwelling.

5.1 Access from street is
- A separate and private entrance from outside..1
- Through a common area, stairs or elevator.....2
- Through someone's else's living quarters.....3
- NA.....8
- Dk/Nr.....9

5.2 How many working entry or exit doorways are there in this dwelling unit?
- One 1
- Two 2
- Three+ ..3
- Dk/Nr ...9

Which of the following apply to the common areas of this building?

		Y	N	NA	Dk/Nr
5.3	Outside fire escape to ground floor 1		2	8	9
5.4	Two separate stairways to ground floor leading to outside doors 1		2	8	9
5.5	Broken or missing interior steps or railings .1		2	8	9
5.6	Missing lightbulbs or badly lit passages 1		2	8	9
5.7	Fire doors in hallways 1		2	8	9
5.8	Smoke detectors in hallways 1		2	8	9
5.9	Fire extinguishers in hallways 1		2	8	9
5.10	Fire alarms in hallways 1		2	8	9
5.11	Exit signs in hallways 1		2	8	9
5.12	Emergency lighting in hallways 1		2	8	9
5.13	Does emergency lighting work? 1		2	8	9
5.14	Fire alarm pull station near exit 1		2	8	9
5.15	Garbage in hallways 1		2	8	9

If the dwelling is greater than four storeys from the ground level inspection is complete. If it is four storeys or less go to item 5.16.

5.16 What is the total area of all vents and windows in the basement (for all dwellings where there is no furnace in basement - item 4.6)
- Square metres .....__
- Slab or posts 88
- Furnace in basement .88
- Dk/Nr 99

5.17 Rate the condition of the balconies, fire escapes and other attached structures above ground level.
- hazards
- decay/rot
- crumbling
- missing items
- sagging

1	2	3	4	5	6	7	NA	DK
/___/	/___/	/___/	/___/	/___/	/___/	/___/	/___/	/___/

5.18 Rate the condition of the porches, stoops and other attached ground level structures.
- hazards
- decay/rot
- crumbling
- missing items
- sagging

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___/

5.19 Provide a general rating of the surface drainage
- standing water
- grading

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___/

5.20 Provide a general of the safety of the immediate vicinity of the building, including walkways, driveways and structures not previously evaluated (including decks, outbuildings, etc.)
- decay/rot
- crumbling
- missing items
- hazardous items
- sagging

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___/

Rate the following three components (items 5.21 to 5.23) in terms of their structural soundness.

5.21 Provide a general rating of structure of the exterior foundation walls or perimeter posts.
- crumbling
- leaning
- loose material
- missing material
- cracks

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___/

5.22 Provide a general rating of exterior walls above foundation.
- tilting
- missing materials
- loose materials
- decay/rot
- crumbling
- bulging
- cracks

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___/

5.23 Provide a general rating of structural soundness of the chimney.
- crumbling
- loose material
- missing material
- cracks
- leaning

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___/

Rate the following three components (items 5.24 to 5.26) in terms of their ability to keep the weather out.

5.24 Provide a general rating of surface of the exterior walls above foundation.
- caulking
- paint condition
- cracks
- decay/rot
- crumbling
- loose material
- missing material

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___/

5.25 Rate the condition of the exterior doors, frames sills trim and weather-stripping in terms of
- missing material
- decay/rot
- paint condition
- fit
- weatherstripping

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___/

5.26 Rate the condition of the exterior windows, frames sashes, weather-stripping and sills in terms of
- missing material
- fit
- paint condition

1 2 3 4 5 6 7 NA DK
/___/___/___/___/___/___/___/___/___/

The following items refer to the roof of the dwelling. If you can obtain an acceptable unobstructed view of the roof surface go to item 6.1, otherwise go to item 6.3.

		1	2	3	4	5	6	7	NA	DK
6.1	Provide a general rating of the roof's surface - missing material - loose material	/	/	/	/	/	/	/	/	/
6.2	Provide a general rating of the roof's structure (excluding soffits and fascia) from an examination of the roofline - sagging - depressions	/	/	/	/	/	/	/	/	/
6.3	Provide a general rating of the condition and installation of the flashing in terms of - decay/rot - damaged material - missing material	/	/	/	/	/	/	/	/	/
6.4	Provide a general rating of the condition of the soffits and fascia - sagging - decay/rot - missing material	/	/	/	/	/	/	/	/	/

6.5 What type of ventilation is provided for the roof?

Ridge ...1
Gable ...2
Soffit ..3
Cowl 4
None 8
Dk/Nr ...9

APPENDIX B

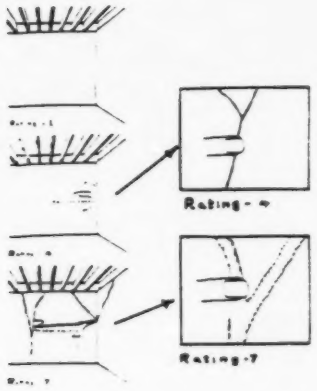
SAMPLE ITEMS WITH DRAWINGS

Rate the ability of the following three components (items 4.1 to 4.3) to perform their structural functions.

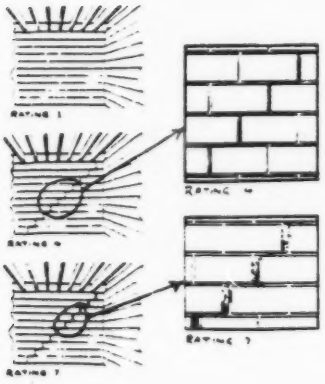
4.1 Rate the interior basement walls in terms of

1	2	3	4	5	6	7	NA	DK
/	/	/	/	/	/	/	/	/

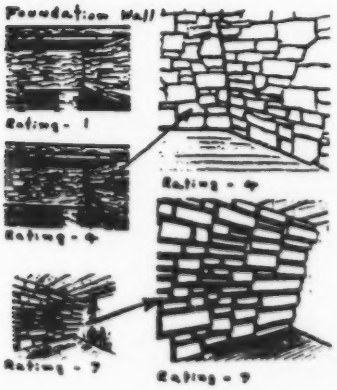
- Cracks (concrete)



- Cracks (concrete block, brick)



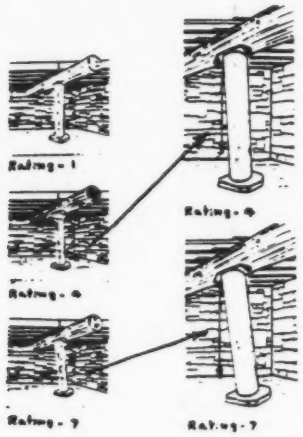
- Leaning (stone)



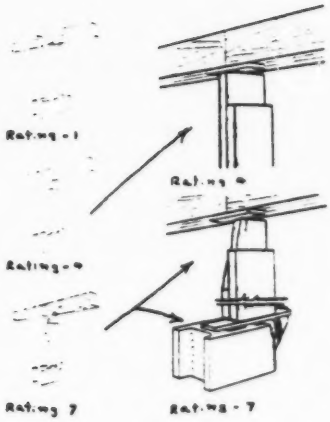
4.2 Rate the support posts or centre columns in terms of

1	2	3	4	5	6	7	NA	DK
/	/	/	/	/	/	/	/	/

- Leaning
  (wood)

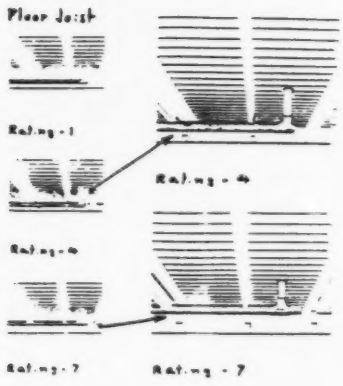


- Missing Materials
  (wood / concrete block)

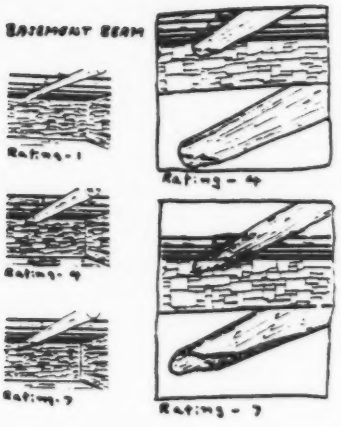


4.3 Rate the joists and carrying beams in terms of 1 2 3 4 5 6 7 NA DK

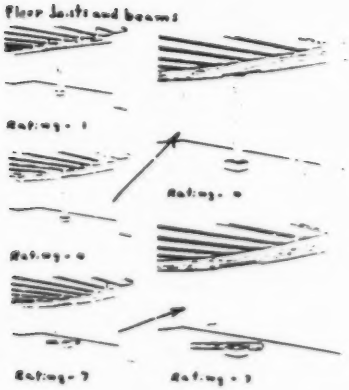
- Cutting and Notching (wood)



- Decay / Rot (wood)



- Sagging (wood)



APPENDIX C

DRAFT CODING OUTLINE

DRAFT CODING OUTLINE

This section presents a draft coding ouline of the MHCSP instrument in tabular form. The main purpose of this is to identify some of the variables to be produced directly or indirectly from the MHCSP instrument.

Derived variables have been minimised in the MHCSP design in order to maximise coding speed and simplicity. Consequently, most of the variables listed below are obtained directly from the instrument. In addition to the identifier variables, only eight instrument variables and two created variable are more than one field in width in order to avoid the common coding errors with missing values.

A number of summary variables are possible with the MHCSP. The necessity for such a development was discussed above in the main report. Summary indices presently identified are for basement perimeter structure (**sumbsper**), basement interior structure (**sumbsint**), basement envelope (**sumbsenv**), structure of attachments (**sumattch**), exterior weather envelope (**sumexenv**) and roof weather envelope (**sumrfenv**). In addition are two variables (**sumrrap** and **sumfire**) to identify the number of RRAP shall and fire safety items failed for each dwelling. An overall summary measure of the structure (**sumbuild**) is also generated.

Other created variables fall into two categories. First there are those such as **famcyc** and **dwelarea** which are difficult for the interviewer to calculate accurately so information is captured and machine processed. (Assuming a machine processing environment.) The second type are measures of, say, adequacy and safety such as **persroom** and **chimfail**. **Persroom** is the number of persons per room and is constructed from two other existing variables. Chimfail is more complex. It is based upon assumptions about the probability or risk of chimney fires given

certain chimney ages, principal fuels and chimney cleaning practices. The final specification of **chimfail** awaits further input from the Research Division of CMHC.

Identifier variables (0.1, 0.2) are included in the proposed data fields; however, it will be necessary to create a separate file for these to meet the confidentiality guidelines. However, it may be useful for municipalities to have access to these since any follow up from the survey could use the identifier codes as address labels. For example, those whose chimney practices should be improved in the opinion of the fire commissioner could be sent a form letter and appropriate literature. Recipients could be identified from vars **chimnew** and **chimclnf** and address labels automatically printed. Two considerations will affect the implementation of this however. First, whether the municipality has access to appropriate hardware and software. Second, whether this practice would contravene privacy guidelines.

Var Label	Var Type: Item	Var Type: Created	Coding Var Source: Item	Coding Var Source: Below	Var Source	Fld. Width
Idnum		X	Actual Number		Instrument	5
Name		X	Actual		Sample	X
Address		X	Actual		Sample	X
Own Type	X		X		1.1	1
Dweltype			To be done			
Yrbuilt	X		X		1.3	4
Yroccup	X		X		1.4	4
Repreed	X		X		1.5	1
Numrooms	X		X		1.6	2
Dwellgth	X		X		1.7	2
Dwelwdth	X		X		1.8	2
Dwelarea		X	Actual Number		1.7 1.8	3
Smokdet	X		X		1.9	1
Smokwork	X		X		1.10	1
Rainleak	X		X		1.11	1
Windcond	X		X		1.12	1
Windwipe	X		X		1.13	1
Windamag	X		X		1.14	1
Colscold	X		X		1.15	1
Closcond	X		X		1.16	1
Colsmold	X		X		1.17	1
Ceilmark	X		X		1.18	1
Chimrepl	X		X		1.19	4
Chimclen	X		X		1.20	1
Chimfreq	X		X		1.21	1
Chimfail		X	X	To Be Done	1.19, 1.21	1
Heat1ful	X		X		1.22	1
Heat2ful	X		X		1.23	1
Heateqip	X		X		1.24	1

Heatfail	X		X		1.25	1
Pltoityp	X		X		1.26	1
Pltoifal	X		X		1.27	1
Plwatsce	X		X		1.28	1
Plwatfal	X		X		1.29	1
Plwatprs	X		X		1.30	1
Plwatgal	X		X		1.31	1
Plfacksk	X		X		1.32	1
Plfachtr	X		X		1.33	1
Plfacbsk	X		X		1.34	1
Plfacbth	X		X		1.35	1
Plsyleak	X		X		1.36	1
Eloutkit	X		X		1.37	1
Elouteat	X		X		1.38	1
Eloutliv	X		X		1.39	1
Eloutbed	X		X		1.40	1
Eloutwrk	X		X		1.41	1
Eloutoth	X		X		1.42	1
Fuseblow	X		X		1.43	1
Elblwkit	X		X		1.44	1
Elblweat	X		X		1.45	1
Elblwliv	X		X		1.46	1
Elblwbed	X		X		1.47	1
Elblwwrk	X		X		1.48	1
Elblwoth	X		X		1.49	1
Numple	X		X		2.1	2
Ageple	X		X		2.2	2
Famcyc		X		To be done	2.1, 2.2	1
Numfam	X		X		2.3	1
Disabnd	X		X		2.4	1
Disabok	X		X		2.5	1
Hholdy	X		X		2.6	1
Persroom		X		Actual number	2.1, 1.6	2

Firesep	X		X	3.1	1
Basement	X		X	3.2	1
Baswalls	X		X	4.1	1
Bassuppt	X		X	4.2	1
Basbeams	X		X	4.3	1
Baswater	X		X	4.4	1
Basdrain	X		X	4.5	1
Furnace	X		X	4.6	1
Sumbsper		X		7-point scale (4.1 + 5.21)/2	1
Sumbsint		X		7-point scale (4.2 + 4.3)/2	1
Sumbsenv		X		7-point scale (4.4 + 4.5)/2	1
Strtaces	X		X	5.1	1
Numexits	X		X	5.2	1
Mltescap	X		X	5.3	1
Mltstnum	X		X	5.4	1
Mltstbrk	X		X	5.5	1
Mltlite	X		X	5.6	1
Mltfrdor	X		X	5.7	1
Mltsmkdt	X		X	5.8	1
Mltfrext	X		X	5.9	1
Mltfralm	X		X	5.10	1
Mltfrsgn	X		X	5.11	1
Mltfrlit	X		X	5.12	1
Mltfrwrk	X		X	5.13	1
Mlterarm	X		X	5.14	1
Mltgarb	X		X	5.15	1
Ventbase	X		X	5.16	1
Abvgdath	X		X	5.17	1
Gdlvlath	X		X	5.18	1
Surfdran	X		X	5.19	1
Vicinsaf	X		X	5.20	1
Extfdwls	X		X	5.21	1
Extwalls	X		X	5.22	1

Chimney	X	X		5.23	1
Sumattch		X	7-point scale	(5.17 + 5.18 + 5.23)/3	1
Extclad	X	X		5.24	1
Extdoor	X	X		5.25	1
Extwind	X	X		5.26	1
Sumexenv		X	7-point scale	(5.24 + 5.25 + 5.26)/3	1
Roofsurf	X	X		6.1	1
Roofstrc	X	X		6.2	1
Roofflsh	X	X		6.3	1
Rooffasc	X	X		6.4	1
Sumrfenv		X	7-point scale	(6.1 + 6.3 + 6.4)/3	1
Ventroof	X	X		6.5	1
Sumrrap		X	Actual number	See below	1
Sumfire		X	Actual number	See below	1
Sumbuild		X	7-point scale	(Sumbsper + Sumbsint + Sumbenv + Sumexenv + Sumrfenx)/5	1